**DYAMOND c1440 llc2160 use-case scenarios**

1. **Interactive visualization of horizontal slices**: In this use-case scenario, domain experts interactively explore cross-sections of DYAMOND data at different heights/depths (what we call “horizontal slices”) over time.   
     
   **walkthrough of scenario:**   
   - a domain expert selects an MITgcm or GEOS field of interest, e.g. from a dropdown list.  
   - given an initial overview visualization showing the entire spatial domain at a default depth, the domain expert:   
   -- navigates to a spatial region of interest, via pan, zoom.   
   -- navigates to a depth/height of interest, e.g. via a dropdown list  
   -- navigates to a timestep or time period of interest.   
   -- steps through timesteps manually (forward and backward) or animates a timeseries (loop).  
   -- saves the result as an mp4.  
     
   **additional features:**  
   - in addition to selecting a field of interest, the domain expert also selects a derived statistical quantity, e.g. rolling mean, to be applied to the field of interest.
2. **Interactive visualization of vertical slices**: Similar to the first use-case scenario, in this scenario, domain experts interactively explore cross-sections of DYAMOND data at different latitudes or longitudes (what we call “vertical slices”) over time.  
     
   **walkthrough of scenario:**  
   - a domain expert selects either a single MITgcm/GEOS field of interest, or a coupled pair of MITgcm + GEOS fields of interest.  
   - the domain expert additionally indicates the location of the vertical cross-section (in degrees latitude or longitude).   
   - given an initial overview visualization showing the vertical slice across the entire spatial domain for the single or coupled fields, the domain expert:  
   -- navigates to a spatial region of interest, via pan, zoom.   
   -- navigates to a timestep or time period of interest.   
   -- steps through timesteps manually (forward and backward) or animates a timeseries (loop).  
   -- saves the result as an mp4.

*-Note: this interface could be designed to reflect our existing vertical slicer utility, which we iteratively designed with the domain experts.* *In our utility, the region of interest and location of vertical slice are provided in a config file*. Example animation: https://data.nas.nasa.gov/viz/vizdata/nmccurdy/DYAMOND\_c1440\_llc2160/dimitris/U\_east-west\_ocean\_vel.\_U\_eastward\_wind\_vel.\_20S-20N\_140W.mp4  
  
**additional features:**  
-the domain expert chooses a vertical axis scaling (linear in computational levels vs. linear in physical levels (MITgcm) or pressure levels (GEOS)) – otherwise, default settings can be used, i.e. linear in computation levels for MITgcm; linear in pressure levels for GEOS.

1. **Data Extracts:** In this use-case scenario, domain experts extract subsets of DYAMOND data for independent analysis.  
     
   **walkthrough of scenario:**  
   - a domain expert indicates data extract parameters:  
   -- MITgcm/GEOS field(s) of interest  
   -- (optional) derived statistical quantity (e.g. rolling mean)  
   -- spatial domain of interest (1D, 2D (vertical or horizontal), 3D)  
   -- spatial sampling (full res, downsampled)  
   -- temporal domain of interest (full timeseries, single timestep, time period)  
   -- temporal sampling  
   - the data extract is then exported for analysis.
2. **Space-time profiles:** This use-case scenario involves generating space-time profiles of data extracts, e.g. for comparison against observations. This is similar to data extracts, however the data for a single timestep spatial domain of interest is projected to a single value.   
     
   **walkthrough of scenario:**  
   - a domain expert space-time profile parameters:  
   -- MITgcm/GEOS field(s) of interest  
   -- (optional) derived statistical quantity (e.g. rolling mean)  
   -- spatial domain of interest (1D, 2D (vertical or horizontal), 3D)  
   -- spatial sampling (full res, downsampled)  
   -- temporal domain of interest (full timeseries, single timestep, time period)  
   -- temporal sampling  
   -- space-time profile function (used to project data for a single timestep to a single value – *we will get example functions to work with*)  
   - the 2D space-time profile is then exported for analysis.